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Case Docket No. 7302
Date: September 14, 2007

Mail Stop Appeals - Patents
COMMISSIONER OF PATENTS
PO Box 1450
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Re: Application of: Jaffee
Serial No.: 10/608,790
Filed: June 27, 2003
For: GYPSUM BOARD FACED WITH NON-WOVEN GLASS FIBER MAT

Art Unit: 1771
Examiner: STEELE, Jennifer A.

Transmitted herewith is/are the following document(s) related to the above-identified application:

Notice of Appeal
 Appeal Brief (53 pages)
 Request for Oral Hearing

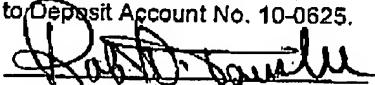
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Appeal Brief	\$500.00	500.00
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Attorney Docket No.: 7302/0140-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Alan M. Jaffee Group Art Unit: 1771
Serial No.: 10/608,790 Examiner: Jennifer A. Steele
Filed: June 27, 2003
For: Gypsum Board Faced With Non-Woven Glass Fiber Mat
Docket No.: 7302/0140-1

Littleton, CO 80127
September 17, 2007

Board of Patent Appeals and Interferences
United States Patent and Trademark Office
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

This Brief is in furtherance of the Notice of Appeal entered July 17, 2007
in the above-identified application.

Fees required under 37 C.F.R. §1.17(f) is set forth in the accompanying
Transmittal of Appeal Brief.

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(I) Real Party in Interest

The real party in interest is Johns Manville International, Inc., as evidenced by a clear chain of Assignment of the entire right, title, and interest by the inventor.

In particular, the entire right, title, and interest was assigned by inventor Alan M. Jaffee to Johns Manville International, Inc., the assignment having been executed on August 20, 2003, and recorded in the U.S. Patent Office on November 5, 2003, at reel 014676, frame 0541.

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(II) Related Appeals and Interferences

The subject matter of the present invention is related to subject matter delineated in US Application Serial No. 10/607,858, which is commonly owned with the instant application and was filed on the same day as the instant application.

There are no other appeals or interferences known to the applicant or to the appellant's legal representative, which will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

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(III) Status of Claims

The claims on appeal are claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33, which have been twice rejected, most recently in the Office Action dated March 19, 2007. A copy of these claims, as amended, is set forth in Section IX - Claims Appendix.

Claim 30 stands withdrawn as being directed to a different invention.

Claims 4, 6, 8, 10, and 24 have been cancelled during prosecution.

Claim 34 was presented by way of an Amendment under 37 CFR 1.111 dated July 18, 2007, but not entered.

Claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33 stand rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 4,637,951 to Gill.

Claims 2, 3, 9, 11, and 18 stand rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 4,637,951 to Gill in further view of US Patent 5,389,716 to Graves.

Claims 18-22 stand rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 5,389,716 to Graves and further in view of US Patent 6,723,670 to Kajander et al.

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Claims 16 and 25-28 stand rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent Publication US 2004/0209071 to Carbo et al.

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(IV) Status of Amendments

The claim listing set forth in Section IX reflects the pending claims, which were presented by way of applicant's amendment under 37 CFR §1.111, which was submitted on December 26, 2006. Entry of these claims was confirmed by the Office Action dated March 19, 2007.

Applicant submitted an amendment under 37 CFR 1.111 on July 18, 2007, after the filing of a Notice of Appeal. The amendment, which included presentation of new claim 34, was denied entry, as set forth in the Advisory Action dated August 6, 2007.

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(V) Summary of Claimed Subject Matter¹

Applicant's invention, as recited by appealed claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33, as amended, is directed to a nonwoven, fibrous mat comprising chopped glass fibers having a relatively small range of average fiber diameters, and a gypsum or hydraulic set board faced with such a mat. The particular combination of fiber diameter and length delineated by the appealed claims affords a surprising and unexpected smoothness, permitting the claimed gypsum board to be painted or otherwise given an aesthetically pleasing finish after installation, without the extensive further surface preparation required with previous fibrous mat faced boards. In various preferred embodiments, the mat has a high permeability, permitting easy extraction of excess water ordinarily present during slurry-based manufacture of gypsum or other hydraulic set board. In addition, the gypsum board may exhibit a combination of desirable structural and functional features that render it fire resistant.

¹ Page and line numbers in Section (V) refer to the specification as filed, unless otherwise noted.

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Fig. 1 of the instant application depicts one embodiment of a gypsum board of the invention, and is reproduced below for convenience.

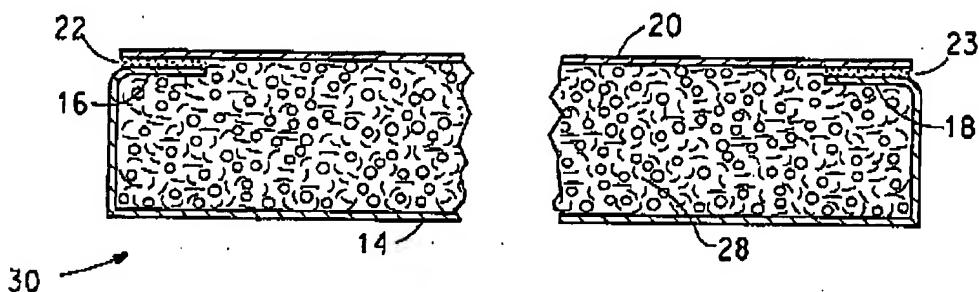


Fig. 1
(USSN 10/607,790)

A. Independent claims 1, 29, and 31-33.

Independent claim 1 is directed to a gypsum board (Fig. 1, #30) having first and second faces (i.e., front and back large surfaces, page 7, line 2) and a set gypsum core (Fig. 1, #28). First and second facers (Fig. 1, #14, #20) are affixed to the first and second faces, respectively. Claim 1 requires that the first facer be a fibrous mat. (Claims 16 and 17, both dependent from claim 1, recite embodiments in which the second facer comprises kraft paper and fibrous mat, respectively.). In the preferred embodiment depicted by Fig. 1, mats 14 and 20 are both fibrous mats, with a small portion of mat 14 being folded over the lateral edges of board 30 to form strips 16 and 18. Second mat 20 covers the second face of gypsum core 28 and is preferably adhesively attached to strips 16 and 18. A similar configuration may be used for kraft

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paper or other second facers. Ordinarily, gypsum board 30 is used in building construction, wherein it is installed by attaching it to construction members, such as wall studs or ceiling joists, positioned such that mat 14 faces a finished space in a building. See page 7, lines 9-23.

First facer 14 of board 30 is a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder (page 7, lines 26-28). The mat's web comprises a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ (page 9, lines 29-30) and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$ (page 7, lines 32-33). The minor portion is composed of glass or mineral fibers that comprise about 1-30 percent of the dry weight of the web (page 6, lines 14-15). Use of a non-woven glass fiber mat imparts a significant improvement in fire resistance over paper-faced gypsum boards.

Independent claim 29 recites, in Jepson form, an improved gypsum board having first and second faces and a non-woven fibrous mat affixed to at least one of the faces (page 7, lines 1-3). The mat comprises a glass fiber web bonded together with a resinous binder (page 7, lines 26-28). The glass fibers of the mat (e.g., mat 14 of Fig. 1) comprise a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ (page 9, lines 29-30) and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$ (page 7, lines 32-33). The minor portion is composed of glass or mineral fibers that comprise about 1-30 percent of the dry weight of the web (page 6, lines 14-15).

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Independent claim 31 is a subcombination claim directed to a fibrous mat appointed for use as a facer for a gypsum board, such as that employed in the gypsum board of claim 1. Specifically, the fibrous mat of claim 31 comprises a non-woven glass fiber web bonded together with a resinous binder. The glass fibers of the web (e.g., mat 14 of Fig. 1) comprise a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ (page 9, lines 29-30) and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$ (page 7, lines 32-33). The minor portion is composed of glass or mineral fibers that comprise about 1-30 percent of the dry weight of the web (page 6, lines 14-15).

Independent claim 32 is also a subcombination claim directed to a fibrous mat appointed for use as a facer for a gypsum board, such as that employed in the gypsum board of claim 1. Like the mat of claim 31, the fibrous mat of claim 32 comprises a non-woven glass fiber web bonded together with a resinous binder. The glass fibers of the web (e.g., mat 14 of Fig. 1) comprise a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ (page 9, lines 29-30) and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$ (page 7, lines 32-33). The minor portion is composed of glass or mineral fibers that comprise about 1-30 percent of the dry weight of the web. Claim 32 further calls for the mat to have an air permeability of at least about 250 cfm/ft² measured in accordance with ASTM Standard D737 at a differential pressure of 0.5 inches of water (page 13, lines 3-10).

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Independent claim 33 delineates a hydraulic set board (page 6, lines 28-30) comprising a hydraulic set material layer having first and second faces. "Hydraulic set material" is expressly defined at page 7, lines 7-10:

By hydraulic set is meant a material capable of hardening to form a cementitious compound in the presence of water. Typical hydraulic set materials include gypsum, Portland cement, pozzolanic materials, and the like.

Like the gypsum board of claim 1, the hydraulic set board of claim 33 employs first and second facers affixed to the first and second faces. At least one of the facers is a fibrous mat comprising a non-woven, glass fiber web bonded together with a resinous binder (page 7, lines 26-28). The glass fibers of the web (e.g., mat 14 of Fig. 1) comprise a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ (page 9, lines 29-30) and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$ (page 7, lines 32-33). The minor portion is composed of glass or mineral fibers that comprise about 1-30 percent of the dry weight of the web.

The smooth surface of the claimed gypsum board permits it to be directly painted to achieve an aesthetically pleasing finish. While conventional paper-faced construction board products are also directly paintable, previous glass fiber mat faced board products are not. Instead, they need a plaster skim coating or like surface preparation (page 6, lines 20-22, compare page 4, lines 10-16 and page 4, line 24 through page 5, line 5). As a result of its smooth surface, the present gypsum or hydraulic set board is thus simpler to make and use than previous boards having glass fiber facers, that required extensive additional preparation steps to attain an acceptable

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surface finish. Without such preparation, even multiple coats of paint are insufficient to obscure the perceptible unevenness replicating the underlying roughness of the glass mat surface of prior art boards.

B. Claims 2-3, 5, 7, 9, 11-23, and 25-28 (dependent from base claim 1).

Claims 2-3, 5, 7, 9, 11-23, and 25-28, which depend directly or indirectly from base claim 1, are directed to preferred embodiments of a gypsum board.

Claims 2-3 delineate preferred compositions of chopped glass fiber used in the present non-fibrous mat facer. Claim 2 recites a Markush group of preferred glass fiber materials (page 9, lines 15-17), while claim 3 calls for E-glass fibers (page 9, lines 25-30).

Claims 5, 7, and 8 recite dimensional characteristics of preferred chopped glass fibers used in the present non-fibrous mat facer. Claims 5 and 7 respectively require that the chopped glass fibers have an average length ranging from about 5 to 30 mm (page 9, lines 26-27) and about 6 to 12 mm, respectively (page 9, line 30).

Claims 9 and 11 recite compositions of preferred fine staple fibers. Claim 9 recites a Markush group of compositions of fine staple fibers preferred for the present mat (page 9, lines 31-33). Claim 11 specifies C-glass fine staple fibers.

Claims 12-15 delineate preferred diameters and amounts of fine staple fibers in the present mat. Claims 12 and 13 respectively delineate average fiber diameters of less than about 3.5 and 1.9 μm (page 8, lines 2-3). Claim 14 calls for the

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fine staple fibers to have a fiber length of less than about 7 mm (page 8, line 4). Claim 15 calls for the minor portion to comprise a portion of the weight of the dry web ranging from about 20 to 30 percent (page 7 lines 32-33).

Claims 18-23 relate to the resinous binder used in the non-woven glass fiber mat. Claim 18 (dependent from claim 1) recites, in Markush form, a preferred resinous binder (page 10, lines 8-16), while claim 19 calls for a more preferred binder of modified acrylic latex (page 11, lines 3-5 and 11-14). Claim 20 (dependent from claim 18) further requires the presence of a cross linker in an amount ranging up to about 10 weight percent (page 11, lines 8-10). Claims 21 and 22 (both dependent from claim 20) further call for about 2 to 5 weight percent of the cross linker and a melamine formaldehyde containing binder, respectively (page 11, lines 8-10). Claim 23 recites a preferred glass transition temperature ranging from about 15 to 45°C for the resinous binder (page 10, lines 18-19).

Claims 25-27 set forth preferred forms of the gypsum core, and respectively call for the core to comprise at least one water repellent agent (page 14, line 34), reinforcing fiber (page 14, line 30), and a biocide (page 12, lines 1-3 and page 14, line 34).

Claim 26 calls for a board having flame resistance sufficient to pass the test of ASTM Method E84, Class 1 (page 11, lines 31-34).

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(VI) Grounds of Rejection To Be Reviewed on Appeal

(A) Whether claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33 should be rejected under 35 U.S.C. §103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 4,637,951 to Gill.

(B) Whether claims 2, 3, 9, 11, and 18 should be rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 4,637,951 to Gill in further view of US Patent 5,389,716 to Graves.

(C) Whether claims 18-22 should be rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent 5,389,716 to Graves and further in view of US Patent 6,723,670 to Kajander et al.

(D) Whether claims 16 and 25-28 should be rejected under 35 USC 103(a) as being unpatentable over US Patent 4,647,496 to Lehnert in view of US Patent Publication US 2004/0209071 to Carbo et al.

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(VII) Arguments

A. The gypsum board of claims 1-3, 5, 7, 9, 11-23, and 25-28; the improved gypsum board of claim 29; the fibrous mat of claims 31-32; and the hydraulic set board of claim 33 meet the conditions for patentability, and should not be subject to rejection under 35 U.S.C. §103(a) as being unpatentable over US Patents 4,647,496 and 4,637,951.

The Examiner has rejected claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33 under 35 USC §103(a) on the following basis:

Claim 1-3, 5, 7, 9, 11-23, 25-29, 31-33 rejected under 35 U.S.C. 103(a) as being unpatentable over Lehnert (US 4,647,496) in view of Gill (US 4,637,951).

Applicant respectfully submits that the gypsum board delineated by amended claims 1-3, 5, 7, 9, 11-23, 25-28; the improved gypsum board of claim 29; the fibrous mat recited by amended claims 31-32; and the hydraulic set board of amended claim 33 are not disclosed or suggested by Lehnert and Gill.

Lehnert et al. provides an exterior finishing system for a building, such as a fibrous mat-faced gypsum board having a water resistant, set gypsum core. Gill et al., which is directed to a fibrous mat facer said to exhibit improved strikethrough resistance. The mat is said to be especially suited as a carrier, substrate, or facer for various curable materials that are placed on one surface of the mat while in a liquid state. Gill et al. further discloses a laminate comprising the foregoing mat and a vinyl

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plastisol coating or a coating of a foam insulation material such as polyurethane or polyisocyanurate foam.

It is respectfully submitted that the basis set forth in the present Office Action is insufficient to establish *prima facie* obviousness of claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33. For the reasons set forth below, applicant maintains that the Lehnert and Gill references, taken as a whole, fail to disclose or suggest every feature delineated by the rejected claims and that a person having ordinary skill in the construction board art would not find basis to carry out the substantial reconstruction of any mat made in accordance with Lehnert and Gill that would be required to reach the subject matter set forth by the rejected claims.

1. Independent claims 1, 27, 29, 31, and 33 meet the conditions for patentability because the combination of Lehnert and Gill does not disclose or suggest the gypsum board of claims 1 and 29; the fibrous mat of claim 31; or the hydraulic set board of claim 33.

a. Independent claims 1, 29, 31, and 33 meet the conditions for patentability because the combination of Lehnert and Gill does not disclose or suggest every feature of the gypsum board of claims 1 and 29; the fibrous mat of claim 31; or the hydraulic set board of claim 33.

Pertaining to these claims, the March 19, 2007 Office Action states the following:

Lehnert teaches a fibrous mat-faced gypsum board comprised of a gypsum core that is sandwiched between two sheets of glass mat (ABST). Lehnert teaches a

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gypsum core that has one or more additives, which improve the water resistance. Lehnert teaches Portland cement and poly(vinyl acetate), poly(vinyl chloride) and acrylic resins for use in the gypsum core that are effective additives to improve water resistance (col. 10, lines 6-25). Portland cement is a hydraulic set material and meets the limitations of claim 33. Lehnert further teaches hydraulic set materials and teaches panels with cement based cores of hydraulic cement or Portland cements (col. 2, lines 38-57). Lehnert teaches glass fibrous mats of good porosity made from chopped fiber in a resinous binder (col. 9, lines 5-38). Lehnert teaches a resinous binder of "modified urea-formaldehyde" (col. 14, lines 35-37).

Appellant respectfully observes that Lehnert calls for facers that are porous glass fiber mats. See, e.g., col. 4, line 57. In addition, Lehnert discloses gypsum that penetrates "but part-way into the thickness of the mat" of one board face (col. 4, lines 59-60) and "substantially through the thickness of the mat" at the other face (col. 5, lines 5-6 and 24-31). It is said to be necessary for the mats to be permeable to allow the high water content of the gypsum slurry to be extracted as liquid or vapor during the production and board curing (col. 9, lines 8-16).

Significantly, Lehnert does not contain any disclosure or suggestion concerning the sizes and types of glass fibers to be used in his fibrous mats, let alone the particular sizes and types recited by applicant's independent claims 1, 29, 31, 32, and 33. The Examiner has acknowledged this lack of disclosure: "Lehnert differs from the current application and does not teach the fiber sizes and compositions of the glass fibrous mats" (Office Action dated March 19, 2007, page 3, first paragraph).

Accordingly, she has cited Gill et al., which is directed to a fibrous mat facer said to exhibit improved strikethrough resistance. The mat is said to be especially suited as a carrier, substrate, or facer for various curable materials that are placed on one surface of the mat while in a liquid state. Gill et al. further discloses a laminate

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comprising the foregoing mat and a vinyl plastisol coating or a coating of a foam insulation material such as polyurethane or polyisocyanurate foam.

The Examiner has cited the Gill et al. disclosure as follows:

Gill teaches a fibrous mat facer with improved resistance to wetting or strike-through (ABST). Gill teaches a fibrous mat that is a blend of glass fibers with a majority of base fibers and a minority of micro fibers that are bonded together with a resinous binder (ABST). The majority of base fibers are chopped glass fibers and have an average micron size of 10 microns which is in the claimed range of 11 +/- 1.5 micron (ABST, col. 3, lines 12-21). Gill teaches a second type of fiber referred to as glass micro fiber that have an average diameter of one micron which is in the range of the claimed range of less than 5.5 micron. Gill teaches glass micro fibers that are staple fibers (col. 3, lines 45-46). The glass micro fibers comprise between 5% and 20% of the total weight of the blend (col. 2, lines 14-16). (Office Action of March 19, 2007, page 3, first paragraph.)

Applicant respectfully traverses both the Examiner's contention that the combination of Lehnert and Gill discloses or suggests the subject matter of applicant's claims and the propriety of combining the references in the manner proposed.

Gill et al. addresses the problem of strikethrough as a significant difficulty in the production of laminate materials. See, e.g., col. 1, lines 27-30. Gill et al. requires the presence of two types of glass fibers, viz. base fibers having a diameter between 8 and 25 microns and microfibers having a mean diameter in the neighborhood of one micron. Col. 3, lines 7-12 and 27-30. It is said that the selection of diameter of the base fibers is determined by process restraints, which limit the lower diameter, and the hand or feel of the mat, which restricts the upper limit. Col. 3, lines 14-19 and 21-26. Applicant respectfully submits that for a skilled artisan, such teaching would lead to selection of the smallest possible fiber. Specifically, applicant maintains that the skilled person would interpret the Gill teaching as suggesting the smallest possible

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diameter. By way of contrast, applicant's glass mat employs fibers having a narrow range of $11 \pm 1.5 \mu\text{m}$, a size range larger than the minimum of $8 \mu\text{m}$ provided by Gill. There is no disclosure or suggestion that would disclose or suggest, or controvert, applicant's surprising and unexpected finding that mat having such a size of base fibers, larger than the minimum of Gill et al.'s base fibers, can nonetheless be used to produce gypsum board having a smooth surface, that can directly accept paint in an aesthetically pleasing manner. See, e.g., the specification at page 4, lines 10-13; page 9, lines 7-14; and Example 6 (page 19, line 19, through page 20, line 7), and §§18-22 of the Declaration Under 37 CFR 1.132 of Alan M. Jaffee submitted December 26, 2006.

b. Independent claims 1, 29, 31, and 33 meet the conditions for patentability because the disclosure of Gill teaches away from the proposed combination with Lehnert, providing a skilled person no reasonable expectation of success.

The fibrous mat provided by Gill et al. is used for an entirely different purpose than applicant's mat. In particular, the Gill mat is said to be especially useful when forming composite materials employing a curable thermoset, such as a foamable material such as a polyurethane or polyisocyanurate rigid foam board, or as a carrier web in the vinyl flooring industry (col. 2, lines 29-36). In both instances, the mat is said to be "resistant remarkably" to strikethrough (lines 39-41). The Gill et al. disclosure is conspicuously devoid of any reference to gypsum or other cementitious construction board. On the other hand, the Examiner has alleged that it would have

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been obvious at the time of the invention to combine the fibrous mats of Gill (which resist strikethrough and therefore have low porosity) in the structure of Lehnert (which requires high porosity mat) to produce an improved gypsum board. However, this contention is submitted to be nothing more than conclusory hindsight, the Examiner having not provided any basis that would suggest even the possibility that applicant's particular combination provides the allegedly obvious improved properties, despite conventional wisdom that would suggest a very different approach, namely use of fibers having the smallest possible diameter.

Applicants respectfully maintain that the foregoing rejection fails to comply with the legal standards for an obviousness rejection set forth by the Supreme Court in *KSR v. Teleflex*, 127 S. Ct. 1727; 2007 U.S. LEXIS 4745; 75 U.S.L.W. 4289 (2007). In particular, the court held that there must be an explicit analysis to establish the factual determinations needed for the traditional test for obviousness required under *Graham v. John Deere Co.*, 383 U.S. 1, 14, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545, 148 USPQ 459, 465, 467 (1966). See also *In re Lee*, 277 F.3d 1338, 1344-45, 61 U.S.P.Q.2d 1430, 1435 (Fed. Cir. 2002) (finding that reliance on "common knowledge and common sense" did not fulfill the PTO's obligation to cite references to support its conclusions as PTO must document its reasonings on the record to allow accountability and effective appellate review).

The present rejection does not establish the level of ordinary skill in the pertinent art and does not establish why it would a skilled person would have been motivated to construct the present gypsum board using a facer mat that intentionally is

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designed for an altogether purpose, the production of foamed insulation boards, in which high strikethrough resistance (and thus low air permeability) is an essential requirement. Neither is it established why a skilled person would have any reasonable expectation that a gypsum board could successfully be constructed with the Gill mat. In particular, appellant maintains that such a structure would have inadequate permeability to permit the water extraction required for gypsum board production and curing. It is further submitted that even if Gill provides a mat having a blend of chopped glass fibers and microfibers, there is no indication in either Lehnert or Gill as to how to modify the Gill mat to attain sufficiently high air permeability. Still further, it is submitted that such modifications would render the Gill mat inoperative for carrying out its intended function, precluding an obviousness determination.

Significantly, the *KSR* court focused on the obviousness of combinations wherein known elements perform their ordinary functions. However, the combination of Gill and Lehnert proposed by the Examiner requires the Gill mat and its binder to function in a way that is diametrically opposite its disclosed use. That is to say, the mat of the present invention is required to be permeable, to permit water extraction, and implicitly to not inhibit strikethrough.

Nothing in Gill relates to board materials in which water vapor is extracted during board curing, since the material to be faced with the Gill mats is not an aqueous slurry, but rather a curable polymer such as foamable material such as a polyurethane or polyisocyanurate rigid foam. The Gill mat is differentiated, since it is said to inhibit strikethrough, whereas embodiments of the Lehnert gypsum material

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require at least some amount of strikethrough to achieve the preferred structure delineated by Lehnert, e.g. at col. 5, lines 24-27. In context, these factors would provide a skilled artisan no basis even to try the Gill mat. Rather, the artisan would instead eschew the Gill mat for making gypsum board, based on Gill's teaching pertaining to inhibited strikethrough. Were the Gill teaching to be modified to provide a mat having applicant's increased permeability, it would be highly likely not to attain the objective of inhibiting strikethrough. Such a result is submitted to preclude the reconstruction proposed by the Examiner, in view of *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). See also *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH* ["A prior art reference may be considered to teach away when 'a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.'" 139 F.3d 877, 45 USPQ2d 1977, 1984 (Fed. Cir. 1998), quoting *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994).] and *McGinley v. Franklin Sports, Inc.* ["We have noted elsewhere, as a 'useful general rule,' that references that teach away cannot serve to create a *prima facie* case of obviousness." 262 F.3d 1339, 1354, 60 U.S.P.Q.2d 1001 (Fed. Cir. 2001) (citing *In re Gurley, supra*)].

Gill provides an extended, quantitative disclosure concerning air permeability. Appellant maintains that the Gill mat's low permeability is no mere incidental or optional feature, but a critical characteristic readily apparent from the Gill specification, notwithstanding the Examiner's citation of Gill's example 3 at col. 6,

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lines 1-10, which he alleges to disclose a Frazier air permeability of 220 cubic feet per second. Appellant agrees that on its face, 220 cubic feet per second converts to an equivalent of 13,200 ft³/minute. However, appellant respectfully submits that such a value would be discounted by a person having ordinary skill in the art as being implausibly large, since it would correspond to a hurricane-like wind velocity on the order of 220 ft/sec. (= 120 mph) at the mat surface during the Frazier test. This conflict, inherent in the Examiner's proposed reading, is readily resolved by recognizing that the units in the cited passage reflect a typographical error, cubic feet per minute having been intended. Significantly, the Gill patent includes some eight other references to air permeability, each being set forth in units of cubic feet per minute. See: (i) abstract, second paragraph; (ii) col. 2, lines 26-27; (iii) col. 5, line 59; (iv) col. 6, line 5; and (v) claims 2, 3, 10, and 12. Nowhere else in Gill is the unit "cubic feet per second" used. In addition, in a detailed discussion of the Frazier test at col. 5, lines 9-26, Gill et al. expressly states that "The resulting reading on the test gives the cubic feet per minute of air which can pass through each square foot of the mat." Lines 19-22, emphasis added. It would be incongruous for a skilled artisan not to question a remarkable sixty-fold jump in air permeability from Example 2 to Example 3 that the Examiner's interpretation necessarily entails. The Gill specification is devoid of any comment that relates to a change in units or to a radical increase in permeability that would have been expected.

Moreover, the Examiner's proposed reading would vitiate the exemplary value of Gill's Example 3. That is to say, the preferred mats recited by Gill's claims 2,

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3, 10, and 12 are characterized by an air permeability that has an upper bound. Specifically, the air permeability is no more than a recited value of 225 cubic feet per minute (claims 2 and 10) or is between recited values of 40 and 225 cubic feet per minute (claims 3 and 12). Were the Examiner's proposed reading correct, then Example 3 would not support any of these preferred claims, the Examiner's presumed air permeability being some sixty times too high to support the claims. On the other hand, applicant maintains the skilled artisan would recognize "cubic feet per second" at col. 6, line 5, as a typographical error, "cubic feet per minute" having been intended, so that Example 3 would in fact directly support the preferred claims. The skilled artisan would be further led to such a reading by recognizing that a mat sufficiently permeable to sustain the radically higher flow rate of 13,200 cubic feet per minute the Examiner infers would almost certainly fail to achieve the central objective of Gill et al., namely provision of a mat invulnerable to strikethrough. Applicant thus submits the Examiner's reading is untenable and contrary to the understanding a skilled person would give.

Applicant further traverses the Examiner's contention that values of air permeability provided by Gill et al. cannot be compared with those of applicant because of the different pressure values used. In particular, Gill et al. employs a manometer differential pressure of 5 inches using a red oil manometer fluid having a specific gravity of 0.827, whereas applicant calls for a 0.5 inch water differential. It is respectfully submitted that a person having ordinary skill would ascertain that the Gill oil differential corresponds to a water differential of about 4.1 inches of water (i.e.,

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0.827 x 5). It is further submitted that the skilled person would recognize, based on knowledge of fluid flow from elementary physics, that a higher differential pressure would result inexorably in a higher flow rate. The skilled person would thus recognize that had Gill et al. measured under applicant's 0.5 inches of water differential, the Gill et al. permeability would have been even lower, further differentiating the low Gill values from applicant's high values. Thus, the Examiner's appeal (Office Action of March 19, 2007, page 10, first paragraph) to *In re Fitzgerald*, 619 F.2d 67, 205 USPQ 594 (CCPA 1980) with respect to the measurement of air permeability is submitted to be misplaced, since it is within the level of routine skill to make the foregoing compensation for the difference in measurement methodology.

Appellant further points to the Declaration Under 37 CFR 1.132 entered December 26, 2006, concerning the combination of Gill and Lehnert. In that Declaration at §§27-28, inventor/declarant Alan M. Jaffee averred that a person having ordinary skill in the glass fiber mat art on or before June 27, 2003 would have regarded the Gill fibrous mat facer as being appointed for use in constructing sheet-form building materials in which the mat was intended to impede any penetration of fluids from the sheet core through the mat facer, based *inter alia* on Gill's disclosure at col. 1, lines 27-30 and 38-39; col. 2, lines 24-29; col. 5, lines 41-48 and 62-65. Mr. Jaffee further averred that the Gill mat would not have been suitable to be incorporated in gypsum or hydraulic set board, the production of which necessarily comprises the extraction of required excess water in the slurry bearing the gypsum or hydraulic set material, since the permeability of the mat would have unacceptably impeded such water extraction.

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Still further, Mr. Jaffee averred that would not have been motivated to look to the teaching of the Gill patent for advice concerning facer mats to be incorporated in gypsum or other hydraulic set boards, based on the minimal permeability of the mats disclosed in that reference.

c. Independent claims 1, 29, 31, and 33 meet the conditions for patentability because the gypsum board of claims 1 and 29, the fibrous mat of claim 31, and the hydraulic set board of claim 33 exhibit properties that are surprising and unexpected, predicating their patentability.

As set forth in the specification, e.g. at page 4, line 10, through page 5, line 3, there is a long-felt need in the construction materials art for gypsum or other or hydraulic set board that enjoys the beneficial properties of known glass fiber mat faced gypsum board (such as fire resistance) and the smooth, easily painted surface of conventional paper-faced gypsum board. If a conventional glass fiber mat faced board is directly painted without a plaster skim coat, the underlying roughness of the mat remains perceptible through the paint layer. The marketplace has regarded such a rough surface as being aesthetically unacceptable.

Appellant has discovered that a suitable selection of glass fibers comprising a particular blend of fiber sizes permits fabrication of a mat that, surprisingly and unexpectedly, is sufficiently smooth to permit direct painting. Contrary to conventional wisdom, choice of the smallest possible fibers does not produce the smoothest surface. It is further surprising and unexpected that the

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smoothness is exhibited in combination with high air permeability, which is generally required for extracting excess water present in the aqueous gypsum slurry from which the board's gypsum core is formed. See, e.g., the specification at page 8, lines 23-25, and page 12, lines 29-34. The fiber blend also limits undesirable intrusion (bleed-through) of the gypsum from the core onto the surface (page 8, lines 20-22).

As further delineated in the specification and as discussed above, the desirable "hand" of the present mat and board permits easy application of surface finishes (such as paint) directly to installed board without extensive surface preparation (page 9, lines 1-10 and page 7, lines 23-26). The elimination of this surface preparation, such as the application of a plaster skim coat, fills a long-standing need in the art by making installation and use of the board more efficient and economical. Such benefits are surprisingly absent from boards made from fibers having diameters falling within other narrow ranges that are outside those required by applicant's claims. Only in light of applicant's own disclosure is it recognized that a directly paintable, non-woven glass fiber mat faced gypsum board could even be produced (specification at page 9, lines 1-10).

The enhanced smoothness of the glass mat of claims 1, 29, 31, 32, and 33 is demonstrated by the comparative data set forth in Example 6 at page 19, line 15, and following. Specifically, mat samples 3 and 5 delineated in Table IV (page 19) and comparative example sample 1 of Tables I and II (pages 16 and 17) are incorporated as facers in gypsum board. Contrary to conventional wisdom, board made with samples 3

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and 5 is smoother than board made with comparative example sample 1 (page 20, lines 1-7).

The surprising nature of this result was recognized by applicant from the outset. See page 9, lines 11-14.

By way of contrast, Lehnert and Gill fail to recognize any of these benefits. It is respectfully submitted that the presence of these advantageous benefits, including *inter alia* smoothness, the provision of directly paintable, glass-fiber mat faced gypsum board, and high air permeability, which would not otherwise be obtained without using applicant's fiber, provides ample basis for predicating patentability of applicant's claims over Lehnert and Gill, under the standard of *In re Geisler*, 116 F.3d at 1465, 1470, 43 USPQ2d at 1362, 1365 (Fed. Cir. 1997). [“The court in *Soni* summed up the rule of that case as follows: ‘[W]hen an applicant demonstrates substantially improved results, as *Soni* did here, and *states* that the results were *unexpected*, this should suffice to establish unexpected results *in the absence of* evidence to the contrary.’ citing *In re Soni*, 34 USPQ 2d 1684, 1688 (Fed. Cir. 1995).” Emphases in the original.] Applicant's disclosure is submitted to be substantial, surprising, and unexpected, because the improved smoothness of the mat permits manufacture of directly paintable gypsum board, heretofore unattainable.

Applicant submits that the ability to directly paint the present gypsum board, without extensive post-installation surface preparation, establishes that the smoothness is a difference in kind, not just in degree, and so cannot properly be regarded as merely an optimization of any of the ranges suggested by Lehnert and Gill.

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Appellant thus maintains the Examiner's reliance on *Boesch* is misplaced, since the art applied provides no basis for recognizing even the possibility that a paintable glass-fiber mat could be produced by any known optimization.

In the Office Action of July 20, 2005, the Examiner disputed applicant's contention that the smoothness of the claimed mat and boards was surprising and unexpected. She further relied on *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980) for the proposition that optimizing a result effective variable involves only routine skill and submission of a declaration to substantiate these statements.

Applicant therefore submitted a Declaration Under 37 CFR 1.132 entered December 26, 2006 pertaining to the smoothness of certain additional gypsum board samples. This Declaration, made by inventor Jaffee, supplemented the qualitative smoothness data in the specification with quantitative smoothness data taken with an optical scattering technique (§14-17).

These data confirmed quantitatively that a sample having an average fiber diameter of 11 μm and an average fiber length of 12 mm was markedly smoother than samples having average fiber diameters of 8 or 13 μm (outside the claim 1 range) and smoother than a sample having an average fiber diameter of 11 μm but an average fiber length of 12 mm (outside the claim 1 range) (§18). Mr. Jaffee averred that the optical data were corroborative of the qualitative data set forth in the patent specification (§20).

Declarant/Inventor Jaffee further averred that for a person having ordinary skill in the glass fiber mat art on or before June 27, 2003, it would have been surprising

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and unexpected that a non-woven mat comprised of glass fiber having an average fiber diameter of 11 μ m would produce gypsum board having a higher smoothness than boards made with mats having average fiber diameters of 13 and 8 μ m. Instead, such a skilled artisan would have inferred that the smoothest surface would result from fabricating gypsum board with mat having the smallest fiber diameter (§21). Mr. Jaffee also averred that such a skilled artisan would have regarded that glass fiber mat made with fiber having an average fiber length of 6 to 12 mm (1/4 to 1/2 inch) would be highly likely to have lower tensile and tear strengths than mat made of glass fiber having the same average diameter but a fiber length of about 19 mm (3/4 inch). Lower tensile and tear strengths would have been known to be undesirable for mat to be used in the production of gypsum board (§§22-25). It is thus submitted that a skilled artisan would have had no motivation to modify the Jaffee species having one inch (25 mm) fiber to comply with applicant's 6-12 mm range.

Appellant further maintains that these Jaffee Declaration data, in combination with the smoothness data of the instant specification at page 20, lines 2-5, provide a pertinent comparison of the smoothness of gypsum board and mat in accordance with claims 1, 29, and 31-33 and that of the closest prior art. In particular, appellant maintains that the prior art applied does not disclose mat having blended fiber diameters that is suitable for facing gypsum board. While Gill admittedly provides mat having certain blends of chopped glass fibers and microfibers, such mat, whether taken in view of Gill by itself or in combination with Lehnert, is not a gypsum board facer mat, because there is no motivation to combine the Lehnert and Gill references in the

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manner proposed. That is to say, the appropriate comparison is between mat having a single average fiber diameter and those having the particular blend of fibers delineated by claims 1, 29, and 31-33.

Appellant maintains the position set forth in the response dated December 26, 2006, traversing the contention that the specification's teaching was inadequate to permit the comparison to be made. In particular, it is submitted that 35 USC 112 requires only that sufficient detail be provided to enable a person skilled in the art to make and use the disclosed invention. As a result, applicant maintains that the description of the examples is, in fact, sufficient to permit the comparison suggested by the Examiner. ("A patent is not a scientific treatise, but a document that presumes a readership skilled in the field of the invention." *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 56 USPQ2d 1332, 1338 (Fed. Cir. 2000)).

The Examiner has taken cognizance of the Jaffee Declaration, but has discounted it as not persuasive. See Office Action of March 19, 2007, at page 8, paragraph 5.

The Examiner has countered that the Declaration is insufficient to establish patentability, asserting that an inadequate number of tests were provided. Applicant submits that what constitutes a "sufficient number" under *Hill* must be determined on a case-by-case basis from the perspective of a person having ordinary skill in the art. Applicant maintains that the number of tests provided by the Declaration data, especially in combination with the data already provided by the

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specification, is sufficient, given the relatively narrow ranges delineated by amended claims 1, 29, and 31-33.

It is submitted that the ruling of the Federal Circuit in *Fromson v. Anitec Printing Plates, Inc.*, 132 F.3d 1437, 45 USPQ2d 1269, 1276 (1997), *cert. denied*, 525 U.S. 817 (1998), is particularly apposite the present issue. The Court held as follows:

That an inventor has probed the strengths and weaknesses of the prior art and discovered an improvement that escaped those who came before is indicative of unobviousness, not obviousness. The district court did not correctly apply the law of obviousness, for there is no suggestion or teaching in the prior art to select from the various known procedures and combine specific steps, along with a new electrical structure, in the way that is described and claimed by Fromson.

Applicant respectfully submits that the discovery of the present combination of chopped glass fibers and fine staple fibers is precisely the sort of improvement that escaped previous workers, as contemplated in *Fromson*, strongly predicated the non-obviousness of the discovery delineated by independent claims 1, 29, and 31-33, as amended, along with the claims dependent thereon.

While applicant acknowledges the need for a "sufficient" number of tests, it is respectfully submitted that the number required to establish criticality must be determined on a case-by-case analysis. Even a single test within a range has been deemed adequate in some instances. *Ex parte Winters*, 11 USPQ2D, 1387, 1387 (BPAI, 1989). See also *In re Kollman*, 595 F.2d 48, 56; 201 USPQ 193 (CCPA 1979), holding that "Often, one having ordinary skill in the art may be able to ascertain a trend in the exemplified data which would allow him to reasonably extend the probative value thereof. The proof, thus considered, might then be sufficient to refute a PTO holding of

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prima facie obviousness." In the present instance, it is submitted that the unexpected finding of smoother mat surface at 11 μm than at flanking values of 8 and 13 μm permits a person having ordinary skill in the art to draw just such a conclusion.

In *Aller*, the court elucidated the concept of criticality in the context of ranges:

Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. Such ranges are termed 'critical' ranges, and the applicant has the burden of proving such criticality. *In re Aller*, 220 F.2d 454, 456; 105 USPQ 233, 235, (CCPA 1955, citations omitted).

In the present instance, applicant maintains that a smoothness sufficient to permit a fibrous mat faced gypsum board to be painted satisfactorily, without skim coating or other post-installation surface finishing, differentiates the present mat and gypsum board in kind, not in degree, from previous gypsum boards and mats lacking this characteristic.

d. Independent claims 1, 29, 31, and 33 meet the conditions for patentability because the gypsum board of claims 1 and 29, the fibrous mat of claim 31, and the hydraulic set board of claim 33 employ a non-woven fibrous mat that is not an obvious extension of any mat disclosed, suggested, or obvious to try in light of Lehnert and Gill.

In *KSR v. Teleflex*, 127 S. Ct. 1727 (2007), the Supreme Court recently amplified the basis for a finding of obviousness under 35 USC 103(a), particularly

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addressing the showing required to ascertain whether a skilled person would have found it obvious to modify and combine teachings of the prior art to reach claimed subject matter. Drawing on its earlier ruling in *United States v. Adams*, 383 U.S. 39, 40, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293 (1966), the Court "recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." However, the Court also noted that the *Adams* decision "relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious."

The *KSR* court also addressed the standard of "obvious to try, stating that:

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

In the present instance, appellant maintains that claims 1, 29, and 31-33 are not obvious over Lehnert and Gill under the standard applied in *KSR*. Appellant submits that the comparative data provided in the specifications and Declarations I and II conclusively establish that the improved smoothness is not a predictable result of the type contemplated in *Adams*, on which the Court relied. Rather, the prior art would have predicted a contrary result, namely preference for using smaller diameter fibers to increase smoothness. The Examiner has also not provided any basis on which a skilled

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artisan would have selected the particular combination of fiber diameter and length recited by claims 1, 29, and 31-33 other than appellant's desired smoothness.

Even more importantly, nothing of record would have predicted that the smoothness achieved in appellant's gypsum board would have provided a level of smoothness adequate to sustain painting of a gypsum board without extra surface preparation. Even though there was a perceived need in the art for a paintable surface, no path to a solution was provided.

Appellant further maintains that the *KSR* Court's consideration of "obvious to try" is predicated on the existence of a "finite number of identified, predictable solutions" that would potentially lead to "anticipated success" (*supra*, emphases added). Even if, *arguendo*, Jaffee were regarded as providing a finite number of solutions, none of those solutions could properly be termed "identified and predictable." Even less would a skilled artisan have an "anticipated" success the Court required.

Rather, the skilled artisan would have been led in altogether different directions, not involving the selection of a blend of glass fibers, with each component of the blend having specific ranges of diameter and length. Attainment of the solution with chopped glass fiber having an intermediate value of average diameter, not at the extremes, only emphasizes the errant guidance the prior art would have given.

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2. Independent claim 32 meets the conditions for patentability because the combination of Lehnert and Gill does not disclose or suggest the fibrous mat of claim 32.

Claim 32 delineates a mat having generally the same features as the mat of claim 31, but adds the requirement that the mat have a permeability of at least about 250 cfm/ft² measured in accordance with ASTM Standard D737 at a differential pressure of 0.5 inches of water.

Appellant maintains that claim 32 is patentable over Lehnert and Gill for at least the same reasons as set forth in Section VII(A)I above concerning claims 1, 29, 31, and 33.

In particular, appellant set forth his position that Lehnert and Gill did not, even in combination, disclose or suggest the mat and gypsum board of claims 1, 29, 31, and 33. Appellant further maintained that Lehnert and Gill were not properly combined, because the Gill mat was intended for a different purpose than Lehnert's and functioned in a diametrically opposite way.

With respect to claim 32, appellant further points to the lack of disclosure in Gill or Lehnert of the high air permeability recited by claim 32. Appellant has contended that the low air permeability of the Gill mat would lead a skilled person away from the claimed combination. Claim 32 adds high air permeability as an express requirement. Gill clearly fails to disclose or suggest a high air permeability, which would vitiate his teaching of a mat that avoids strikethrough. Even in combination with Lehnert, there is no basis in Gill even to suggest to a skilled person how to modify the

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Gill mat to attain high permeability. Even less is there any motivation to do so. The present rejection fails to provide an analysis that would underlie the Examiner's rejection. Such an analysis is expressly required under *KSR* as a predicate for a proper obviousness rejection.

3. Dependent claims 2-3, 5, 7, 9, 11-23, and 25-28 meet the conditions for patentability because Jaffee does not disclose or suggest the gypsum board of claim 1, let alone the gypsum board of claims 2-3, 5, 7, 9, 11-23, and 25-28 dependent thereon.

Applicants respectfully submit that claims 2-3, 5, 7, 9, 11-23, and 25-28 are patentable for at least the same reasons as claim 1, from which they depend. Significantly, the Examiner has alleged disclosure of each of the features delineated by claims 2-3, 5, 7, 9, 11-23, and 25-28 in Gill, and not in Lehnert. Section VII(A)1b above sets forth appellant's argument that the Examiner has not provided a tenable basis for combining Gill with Lehnert. That is to say, appellant maintains that Gill pertains only to mat not compatible with gypsum board production because of its low air permeability, so that a skilled artisan would have no motivation or expectation that any fiber blend or other disclosure therein could be combined with Lehnert to produce a gypsum board. Accordingly, it is submitted that there is no disclosure or suggestion of the preferred gypsum boards of claims 2-3, 5, 7, 9, 11-23, and 25-28.

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4. Conclusion

In view of the foregoing remarks, it is submitted that present claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33 patentably define over Lehnert and Gill. Accordingly, reversal of the rejection of claims 1-3, 5, 7, 9, 11-23, 25-29, and 31-33 under 35 USC §103(a) over Lehnert and Gill is respectfully requested.

B. The gypsum board of claims 2, 3, 9, 11, and 18 meets the conditions for patentability, because Lehnert, Gill, and Graves, whether taken singly or in combination, do not disclose or suggest the subject matter of claim 1, let alone the subject matter of claims 2, 3, 9, 11, and 18 dependent thereon, and should not be subject to rejection under 35 U.S.C. §103(a) as being unpatentable over US Patents 4,647,496, 4,637,951, and 5,389,716.

The Examiner has rejected claims 2, 3, 9, 11, and 18 under 35 USC §103(a) on the following basis:

Claim 2, 3, 9, 11 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Lehnert (US 4,647,496) in view of Gill (US 4,637,951) in further view of Graves (US 5,389,716). (Office Action of March 19, 2007, page 4, paragraph 2.)

Graves discloses a binder composition for fibrous mats that is said to be fire resistant when cured. The mats are said to be suitable for a backing layer for gypsum.

The Examiner further cites Graves as follows:

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Graves teaches a fire resistant bonder for fibrous mats where the mats are comprised of glass fibers or mineral fibers (col. 2, lines 34-36). Graves teaches glass fibers strands that are to Gill (US 4,129,674) (col. 11, lines 11-20). Graves teaches a binder for use in fibrous mats compatible with glass fibers, mineral wool fibers, metal fibers, metal coated glass or graphite fibers. Graves teaches the glass fibers are obtained from conventional "E" glass and derivative thereof including "A" glass, "C" glass, "S" glass and "T" glass (col. 10, lines 4-11). Graves teaches glass fiber improve the structural foundation of the finished mat by increasing its tear resistance and tensile strength and improve the folding and working quality of the mat. Graves teaches that glass fibers are also relatively fire resistant but teaches mineral wool is more fire resistant (col. 10, lines 44-50). Graves teaches fiber sizes and teaches the fiber sizes and blend referring to Gill (col. 11, lines 11-33). (Office Action of March 19, 2007, page 4, final paragraph, through page 5, first paragraph.)

Appellant respectfully submits that the addition of Graves fails to cure the failure of Lehnert and Gill, even in combination, to disclose or suggest the invention of claim 1, from which claims 2, 3, 9, 11, and 18 depend directly or indirectly. For the reasons set forth above concerning the rejection of claim 1 over Lehnert and Gill, appellant maintains that Gill's disclosure of microfibers in combination with chopped fibers cannot properly be used to satisfy the blend requirement of claim 1. Graves does not remedy this deficiency.

Graves discloses a wide range of fiber diameters and lengths. The disclosed diameter ranges admittedly have a broad overlap with applicant's ranges, e.g. the disclosure of diameters ranging from about 3 to about 30 microns (col. 10, lines 19-21) and lengths from 1 to 75 mm (col. 10, lines 16-19). However, the Examiner also has not pointed to any disclosure in Graves of any mat employing a blend of fiber diameters, let alone the particular blend required by base claim 1. Significantly absent from the Graves reference is any discussion pertaining to the smoothness of gypsum board employing the mat disclosed.

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In view of the foregoing remarks, it is submitted that present claims 2, 3, 9, 11, and 18 patentably defines over Lehnert, Gill, and Graves. Accordingly, reversal of the rejection of claims 2, 3, 9, 11, and 18 under 35 USC §103(a) over Lehnert, Gill, and Graves is respectfully requested.

C. The gypsum board of claims 18-22 meets the conditions for patentability, and should not be subject to rejection under 35 U.S.C. §103(a) as being unpatentable over US Patents 4,647,496, 5,389,716, and 6,723,670.

The Examiner has rejected claims 18-22 under 35 USC §103(a) on the following basis:

Claim 18-22 rejected under 35 U.S.C. 103(a) as being unpatentable over Lehnert (US 4,647,496) in view of Graves (US 5,389,716) and in further view of Kajander et al. (US 6,723,670). (Office Action of March 19, 2007, page 5, last paragraph.)

Recognizing the failure of Lehnert to disclose a resinous binder comprising a melamine formaldehyde cross-linker, the Examiner has cited Kajander et al.

Significantly, the rejection of claims 18-22, which does not include the Gill reference as applied to claim 1 above, fails to articulate any basis to establish the obviousness of the dimensions and characteristics of the glass fiber required by claim 1 and thus inherited by claims 18-22. Nothing in Lehnert or Graves, either singly or in combination, is cited to provide these features, particularly the inclusion of the minor

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portion of fine staple fibers of claim 1. Appellant respectfully maintains that Kajander et al. does not cure this deficiency.

Furthermore, the gypsum wallboard of Kajander et al. is distinguished from conventional wallboard by the incorporation of the foamed facer. In particular, the formation of the Kajander mat includes, as an integral part of its production, the deposition of a foam layer on top of the wet non-woven fibrous bindered web layer. The foam and the fibrous layer then are jointly cured. During subsequent gypsum board production, an unbound surface of the mat is applied to the board core. See col. 6, lines 44-55. Significantly, it is said that glass fibers of any diameter can be used, with 13 and 16 μm diameter fibers being preferred. Col. 7, lines 19-23. It is further stated that a substantial advantage of the Kajander et al. invention is that it enables use of larger, less expensive fibers, which are expressly distinguished from 9 and 10 μm diameter fibers. Col. 7, lines 25-27 and 30-32. It is thus submitted that the skilled person would be led away from the selection of a mixture that includes $11 \pm 1.5 \mu\text{m}$ base fibers. Even less would the skilled person considering Kajander et al. be led also to include the smaller microfibers delineated by applicant's claim 1, from which claims 18-22 depend.

Accordingly, it is submitted that claims 18-22 should not be subject to rejection under 35 USC §103(a) over the combination of Lehnert, Graves, and Kajander.

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D. The gypsum board of claims 16 and 25-28 meets the conditions for patentability and should not be subject to rejection under 35 U.S.C. §103(a) as being unpatentable over US Patent 4,647,496 and US Patent Publication 2004/0209071.

The Examiner has rejected claims 16 and 25-28 under 35 USC §103(a) on the following basis:

Claim 16 and 25-28 rejected under 35 U.S.C. 103(a) as being unpatentable over Lehnert (US 4,647,496) in view of Carbo (US 2004/0209071). (Office Action of March 19, 2007, page 6, last paragraph.)

Carbo discloses acoustical tiles, also known as acoustical panels, ceiling tiles, or ceiling panels, that are said to inhibit the growth of fungus, bacterial and other micro-organism.

The Examiner has not pointed to any disclosure in Carbo of a fibrous mat comprising a non-woven glass fiber web of the type required by claim 1. Like the foregoing rejection of claims 18-22 over Lehnert, Graves, and Kajander, the rejection of claim 25 does not include Gill. Accordingly, Carbo does not cure the lack of disclosure in Lehnert of any mat having a combination of a major portion of chopped glass fibers and a minor portion of fine staple fibers.

In view of the foregoing remarks, it is submitted that present claim 25 patentably defines over Lehnert and Carbo. Accordingly, reversal of the rejection of claim 25 under 35 USC §103(a) over Lehnert and Carbo is respectfully requested.

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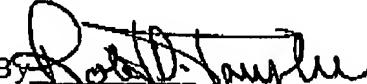
(VIII) Conclusion

In light of the foregoing remarks, it is respectfully submitted that the gypsum board of claim 1 (and claims 3, 5, 7, 9, 11-23, and 25-28 dependent thereon); the improved gypsum board of claim 29; the non-woven fibrous mat of claims 31-32; and the hydraulic set board of claim 33 are not disclosed or suggested by any combination of the art references applied, and thus meet the conditions for patentability required by 35 USC §103(a).

Accordingly, reversal of the rejection of claims 1, 3, 7, 9, 11-23, 25-29, and 31-33 under 35 USC §103(a), and allowance of the present application, are earnestly solicited.

Respectfully submitted,

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(IX) Claims Appendix — Claims On Appeal

1. (previously presented) A gypsum board, comprising:
 - a. a gypsum layer having a first face and a second face and comprising set gypsum; and
 - b. first and second facers affixed to said first and second faces, said first facer being a fibrous mat comprising a non-woven web bonded together with a resinous binder, and said web comprising a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$, said minor portion being composed of glass or mineral fibers and comprising about 1-30 percent of the dry weight of the web.
2. (previously presented) A gypsum board as recited by claim 1, wherein said chopped glass fibers are composed of at least one member selected from the group consisting of E glass, C glass, T glass, sodium borosilicate glass, and mixtures thereof.
3. (previously presented) A gypsum board as recited by claim 1, wherein said chopped glass fibers are composed of E glass.
4. (cancelled)
5. (previously presented) A gypsum board as recited by claim 1, wherein said chopped glass fibers have an average fiber length ranging from about 5 to 30 mm.

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6. (cancelled)
7. (previously presented) A gypsum board as recited by claim 1, wherein said chopped glass fibers have an average fiber length ranging from about 6 to 12 mm.
8. (cancelled)
9. (previously presented) A gypsum board as recited by claim 1, wherein said fine staple fibers are composed of at least one member selected from the group consisting of fibers of glass, mineral wool, slag wool, ceramic, carbon, metal, refractory materials, and mixtures thereof.
10. (cancelled)
11. (original) A gypsum board as recited by claim 9, wherein said fine staple fibers are composed of C-glass.
12. (original) A gypsum board as recited by claim 1, wherein said fine staple fibers have an average fiber diameter of less than about 3.5 μm .
13. (original) A gypsum board as recited by claim 1, wherein said fine staple fibers have an average fiber diameter of less than about 1.9 μm .
14. (original) A gypsum board as recited by claim 1, wherein said fine staple fibers have a fiber length of less than about 7 mm.
15. (original) A gypsum board as recited by claim 1, wherein said minor portion comprises a portion of the weight of the dry web ranging from about 20 to 30 percent.
16. (original) A gypsum board as recited by claim 1, said second facer comprising kraft paper.

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17. (original) A gypsum board as recited by claim 1, said second facer comprising a fibrous mat.
18. (original) A gypsum board as recited by claim 1, wherein said resinous binder is composed of at least one member selected from the group consisting of urea formaldehyde; conventional modified urea formaldehyde; acrylic resin; melamine resin; high nitrogen melamine resin; homopolymer and copolymer of polyacrylic acid having a molecular weight of less than 10,000; crosslinking acrylic copolymer; crosslinked vinyl chloride acrylate copolymer; and modified acrylic latex binder.
19. (original) A gypsum board as recited by claim 1, wherein said resinous binder is composed of a modified acrylic latex binder.
20. (original) A gypsum board as recited by claim 18, wherein said resinous binder further comprises a cross-linker in an amount ranging up to about 10 weight percent.
21. (original) A gypsum board as recited by claim 20, wherein said cross linker is present in an amount ranging from about 2 to 5 weight percent.
22. (original) A gypsum board as recited by claim 20, wherein said cross linker comprises melamine formaldehyde.
23. (original) A gypsum board as recited by claim 1, wherein said resinous binder has a glass transition temperature ranging from about 15 to 45°C.
24. (cancelled)

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25. (original) A gypsum board as recited by claim 1, wherein said gypsum core further comprises at least one water repellent agent.
26. (original) A gypsum board as recited by claim 1, wherein said gypsum core further comprises a biocide.
27. (original) A gypsum board as recited by claim 1, wherein said gypsum core further comprises reinforcing fiber.
28. (original) A gypsum board as recited by claim 1, said board having flame resistance sufficient to pass the test of ASTM Method E84, Class 1.
29. (previously presented) In a gypsum board having a first face and a second face and a non-woven fibrous mat affixed to at least one of said faces, the improvement wherein said mat comprises a web bonded together with a resinous binder and comprising a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ and a minor portion composed of fine staple fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$, said minor portion being composed of glass or mineral fibers and comprising about 1-30 percent of the dry weight of the web.
30. (withdrawn) A process for manufacturing an article comprising a hydraulic set material layer having first and second faces, and first and second facers affixed thereto, at least one of said facers comprising a non-woven, fibrous mat, the process comprising:

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- a. forming an aqueous slurry comprising at least one member selected from the group consisting of anhydrous calcium sulfate, calcium sulfate hemihydrate, and hydraulic setting cement;
- b. distributing the slurry to form a layer on said first facing;
- c. applying said second facing onto the top of said layer;
- d. separating the resultant laminate into individual articles; and
- e. drying the articles,

wherein at least one of the facers comprises a fibrous mat having a fibrous web comprised of a blend of a major portion of chopped continuous glass fibers, an average fiber diameter of which is in the range of about 8 to 17 μm and a minor portion of which is composed of fine staple fibers having an average fiber diameter of less than about 5.5 μm , said minor portion being composed of glass or mineral fibers and comprising about 1-30 percent of the dry weight of the web, and said major and minor portions being bound together with a resinous binder.

31. (previously presented) For use as a facer for a gypsum board, a fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about 11 ± 1.5 and a minor portion composed of fine staple glass or mineral fibers having an average fiber diameter of less than about

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5.5 μm , said minor portion comprising about 1-30 percent of the dry weight of the web, and the resinous binder comprising a modified acrylic latex binder.

32. (previously presented) A fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ and a minor portion composed of fine staple glass or mineral fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$, said minor portion comprising about 1-30 percent of the dry weight of the web, the mat having a permeability of at least about $250 \text{ cfm}/\text{ft}^2$ measured in accordance with ASTM Standard D737 at a differential pressure of 0.5 inches of water.

33. (previously presented) A hydraulic set board, comprising:

- a hydraulic set material layer having a first and a second face; and
- first and second facers affixed to said first and second faces, at least one of said facers comprising a fibrous mat comprising a non-woven web bonded together with a resinous binder, said web comprising a blend of a major portion composed of chopped glass fibers having an average fiber diameter of about $11 \pm 1.5 \mu\text{m}$ and a minor portion composed of fine staple glass or mineral fibers having an average fiber diameter of less than about $5.5 \mu\text{m}$, said minor portion comprising about 1-30 percent of the dry weight of the web.

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34. (not entered) A gypsum board as recited by claim 1, wherein said mat has a permeability of at least about 250 cfm/ft² measured in accordance with ASTM Standard D737 at a differential pressure of 0.5 inches of water.

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Evidence Appendix

Not applicable.

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(XI) Related Proceedings Appendix

Not applicable.